

Chapter 4

Viewing Models

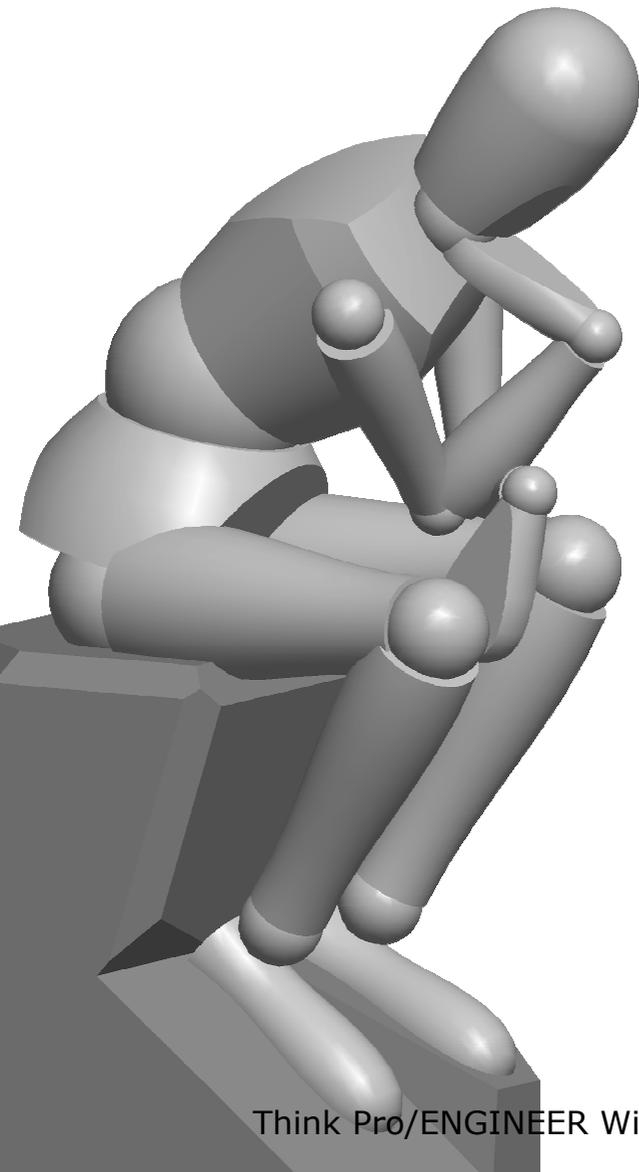
Display Styles

Zooming

Panning

Orientation

Spin



Display Styles

Three-dimensional models may be displayed with various styles.

Shading

The default style for Pro/ENGINEER is **Shading** (shaded mode turned on). This is a basic 'flat' shade, meaning that all surfaces oriented in the same direction are displayed with the exact same color and brightness, and that all surfaces will be illuminated equally according to a default light source.

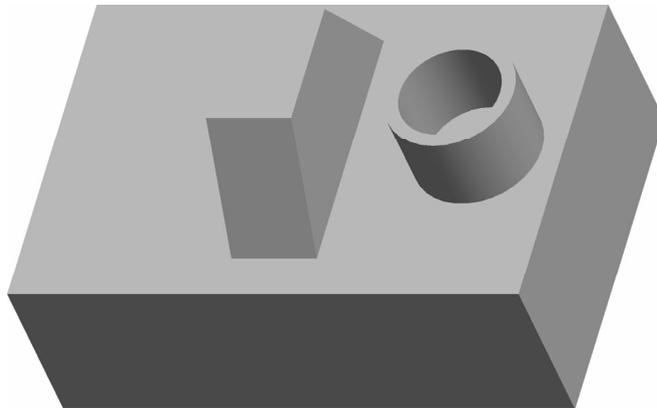


Fig. 4-1
Three-dimensional model with Shading

Notice how the top of the cylindrical feature, shown in Figure 4-1, seems to blend with the top of the rectangular feature, which also blends with the top of the trapezoidal feature. This is usually sufficient for mechanical design purposes, but if a more sophisticated photo rendering or color variation is desired, those options may be set by selecting the **Color and Appearance**, **Model Setup** and **Display Settings** options found in the View menu.

By selecting the proper icon in the Main Toolbar, as shown in Figure 4-2, or by selecting **Tools > Environment > Display Style**, the display of the three-dimensional model may be changed from Shading to one of three additional types.

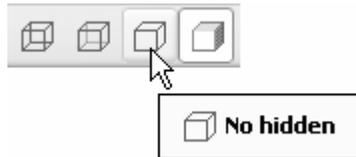


Fig. 4-2
Selecting the display style from the toolbar

No Hidden

The **No hidden** mode will display only the edges of the three-dimensional model which are not obscured (hidden) by the rest of the model, as shown in Figure 4-3.

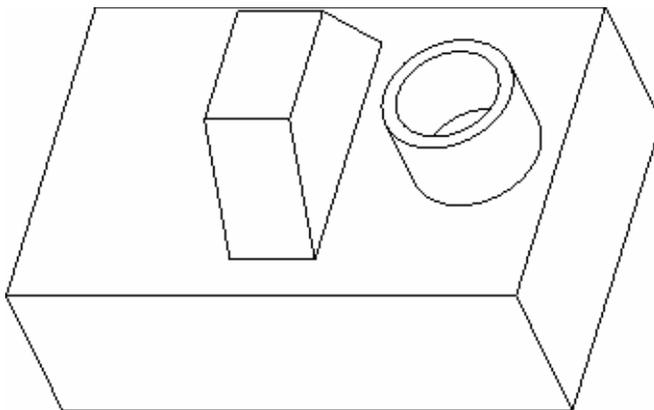


Fig. 4-3
Three-dimensional model with No hidden

All of the model's surfaces will appear the same as the background.

Hidden line

All of the model's edges are displayed in **Hidden line** mode, as shown in Figure 4-4, however, any obscured (hidden) edges will be displayed in grey.

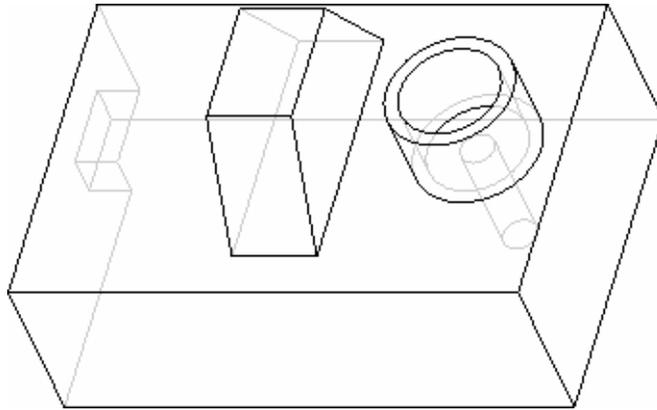


Fig. 4-4
Three-dimensional model with Hidden line

Notice that geometry which was not visible in **Shading** and **No hidden** modes is now visible in **Hidden line** mode.

Wireframe

By selecting **Wireframe**, all edges will be shown equally, regardless of their location on the model, as shown in Figure 4-5.

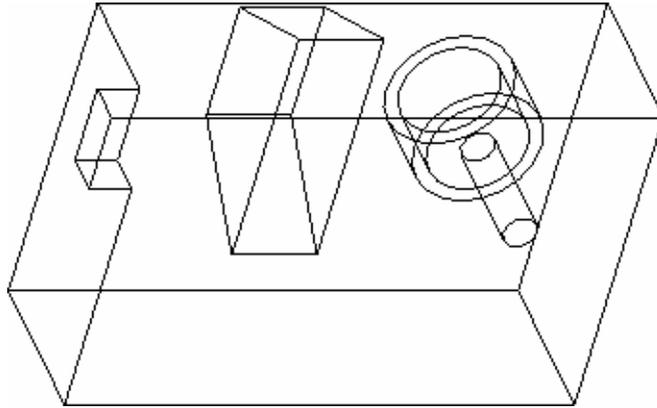


Fig. 4-5
Three-dimensional model in wireframe

Changing the display from **Shading** to **Wireframe** does not convert the model from a solid to a wireframe model. Regardless of which display mode is selected, the Pro/ENGINEER data remains the same, and the display mode only controls how the data is displayed on the screen.

Zooming

Zooming allows you to 'move in' close to see detail on a model, and 'move out' to see a larger portion, or entire model. The Pro/ENGINEER model remains a constant size and position in three-dimensional space, and only you the user are moving closer or further away from the model while zooming in and out.

Zooming with the Toolbar

You may zoom in to and out of a specified area by selecting the  **Zoom In** and  **Zoom Out** icons from the Main Toolbar. If at any time you have zoomed too far in or out, and would like to return the display back to its default setting, you may select the  **Refit** icon.

Zooming with the Mouse

While holding down the **Ctrl** key with one finger, and the **MMB** simultaneously, drag the mouse up (away from you) to zoom out, and down (closer to you) to zoom in.

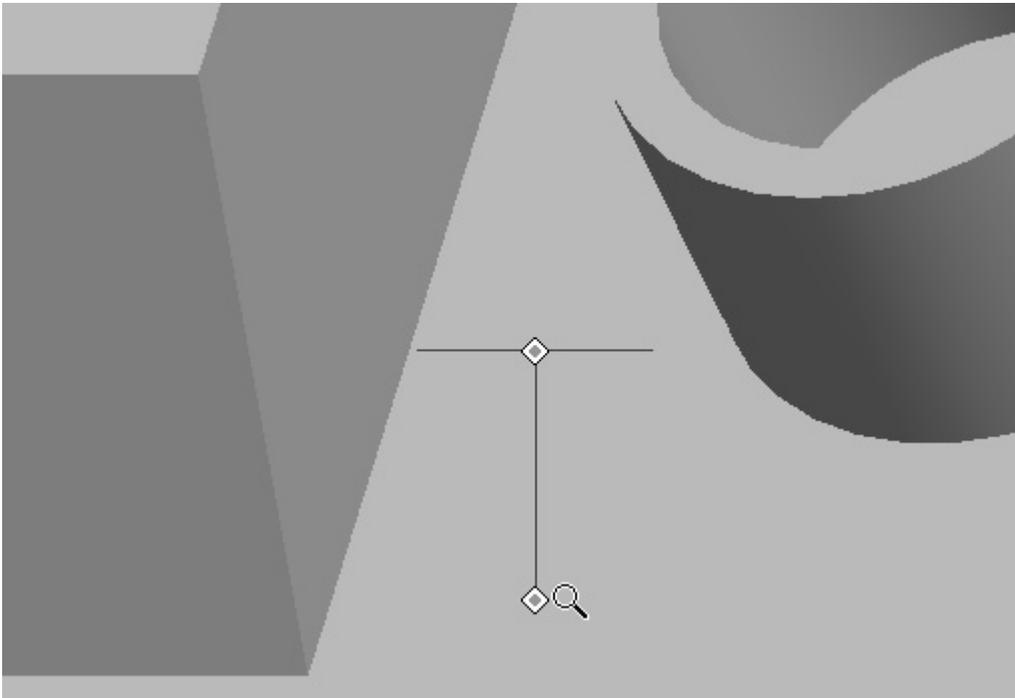


Fig 4-6
Zooming in with the mouse

A horizontal bar with a diamond will mark your starting position (zoom center), and as you drag the mouse, a vertical bar with a diamond will 'rubber-band', as shown in Figure 4-6, above or below the horizontal bar. You can control the zoom center simply by positioning the cursor before executing the command. When the desired amount of zoom is achieved, release both the mouse button and keyboard.

Zooming with the Scroll Wheel

The easiest way to zoom in and out is to place the cursor on the desired zoom center, and while leaving the mouse stationary, use the scroll wheel, as shown in Figure 4-7.



Fig. 4-7
Scroll wheel for zooming

Roll the wheel away from you to zoom out, and roll it toward you to zoom in.

Panning

Panning is a technique where the orientation and zoom factor of your model remains constant, but the view is shifted in any direction in a plane parallel to the screen. To pan, simply hold down the **Shift** key and **MMB** and drag the mouse. As with the zoom, you will see a starting diamond shape and a 'rubber-band', as shown in Figure 4-8. The view will move dynamically as you drag the mouse. Release both the keyboard and mouse to set the view.

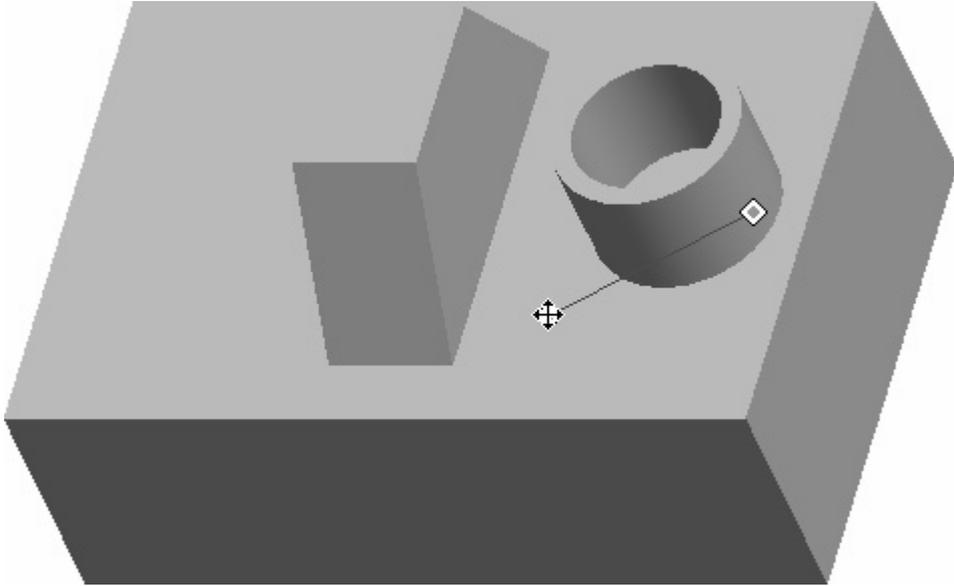


Fig. 4-8
Panning the view

Orientation

Trimetric Orientation

By default, Pro/ENGINEER displays three-dimensional models using trimetric orientation, where the direction of viewing is such that all of the three axes of space appear unequally foreshortened. The scale along each of the three axes and the angles among them are determined separately as dictated by the angle of viewing. The term trimetric comes from the Greek for 'three measure', reflecting that the scale along each axis of the projection is unique.

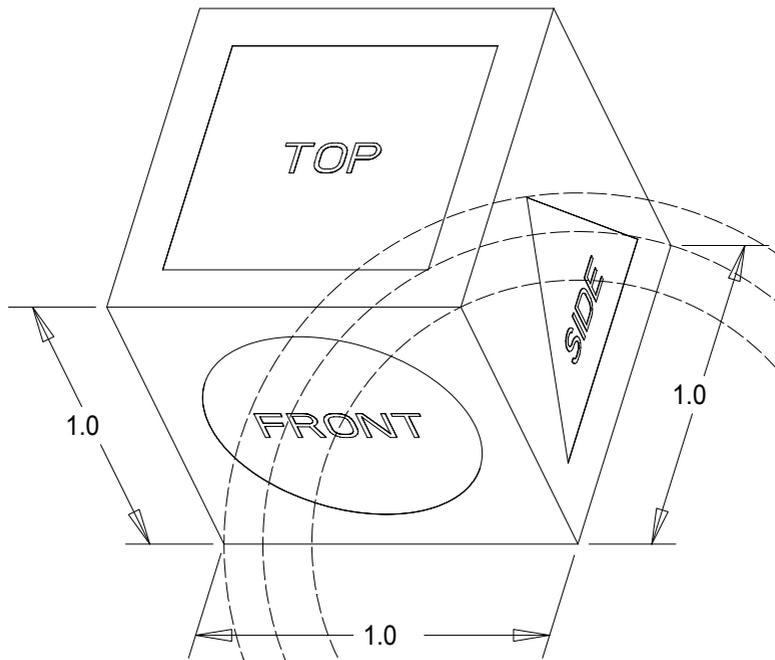


Fig. 4-9
Trimetric projection

Figure 4-9 shows a perfect cube in trimetric projection. It's length, width and height are all equally set at one unit (1.0), yet appear to be of different values. It is important to note that this is only how the cube is displayed on the screen or a drawing, not how it was designed. The true size and shape of the solid model is not affected by the projection type.

Isometric Projection

Isometric projection is a form of axonometric projection, in which the three coordinate axes appear equally foreshortened and the angles between any two of them are 120° . The term isometric comes from the Greek for 'equal measure', reflecting that the scale along each axis of the projection is the same.

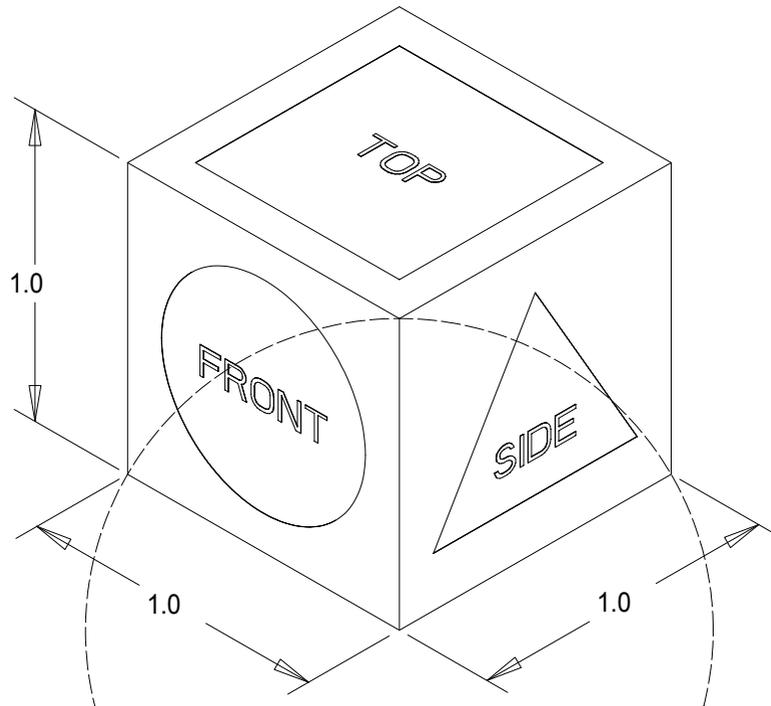


Fig. 4-10

Isometric Projection

Figure 4-10 shows the same perfect cube using isometric projection. Notice that the length, width and height (which are equal in the solid model) are shown equally on the screen. To set the standard orientation to isometric, select from the menu, **Tools > Environment > Standard Orient > Isometric**.

Spin

Dynamic

To 'spin' your model (change its orientation), simply hold down the **MMB** and drag the mouse. The model will dynamically spin, meaning that any movement in the mouse is immediately reflected on the screen, about its default spin center. Figure

4-11 shows spinning the model dynamically, with the Spin Center turned on (default setting).

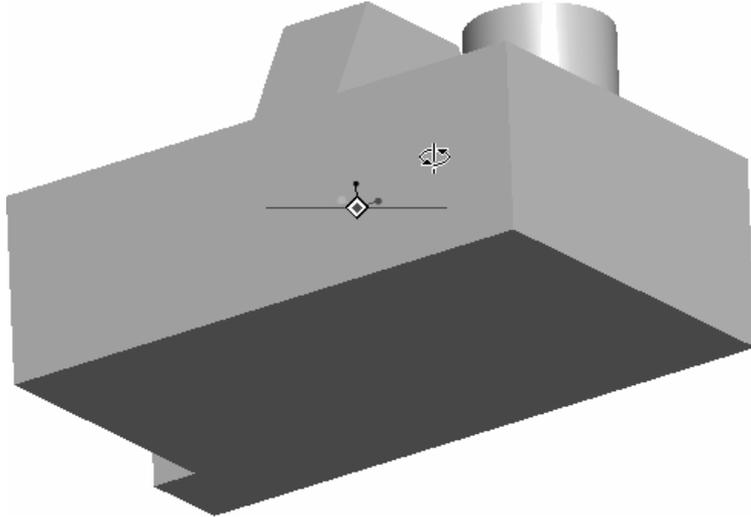


Fig. 4-11
Dynamic spin with Spin Center on

The Spin Center is automatically placed in the geometric center of the model, and is indicated by the three-lobed, green, red and cyan icon, as shown in Figure 4-12.

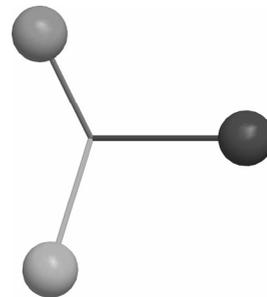


Fig. 4-12
Spin Center

When the Spin Center is turned off by selecting the  **Spin Center** icon on the Main Toolbar, the model can be spun relative to where the cursor is placed on the screen with the **MMB**. Figure 4-13 shows the model being spun relative to an area near the corner of the model.

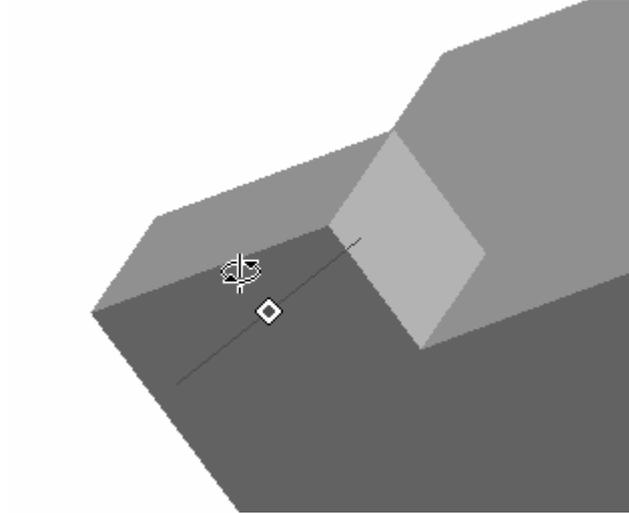


Fig. 4-13
Dynamic spin with Spin Center off

Orient Mode may be turned on by selecting the  **Orient Mode** icon on the dashboard. This suspends the geometry creation abilities of Pro/ENGINEER, and allows for additional spin controls to be used to display the model.

These options are accessed by holding down the **RMB**, as shown in Figure 4-14, and selecting the desired spin type.

Anchored

The Anchored spin type is dynamic, but retains a 'rubber-band' from a triangle at the starting position to a triangle handle at the other end, as shown in Figure 4-15. Releasing the **MMB** in this position will set the orientation, but if the mouse is held down, the two triangles may be matched up so that the display may return to the original position.

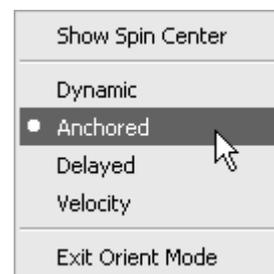


Fig. 4-14
Selecting spin type

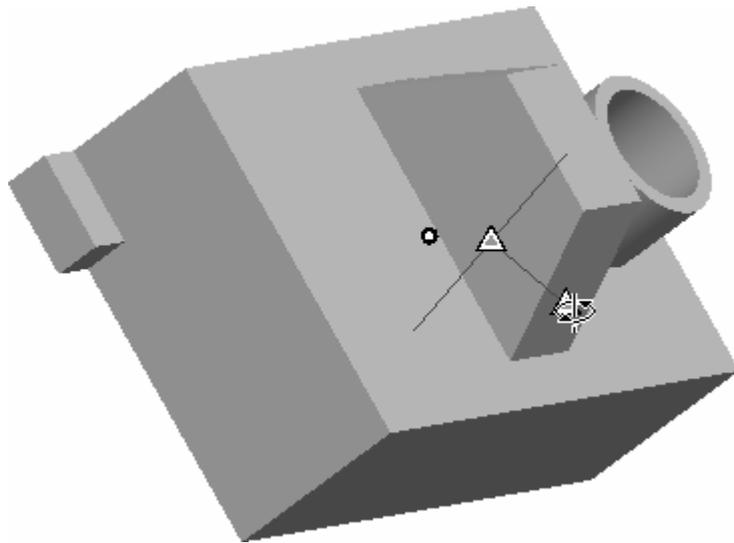


Fig. 4-15
Anchored spin

Delayed

Delayed spin operates the same as Anchored (uses squares instead of triangles), but it is not dynamic. The orientation of the model will not change until the **MMB** is released. This is useful for very large models which may take a long time to dynamically spin, or when the session of Pro/ENGINEER is being shared over the Internet.

Velocity

Velocity spin is dynamic, but the model will continue to spin in the same direction as the handle (circle, in this case) is being dragged. The speed of the automatic spinning is sensitive to the distance between the starting and ending handles (rubber-band). Releasing the **MMB** stops the spin.

To return to normal editing mode, select the  **Orient Mode** icon to turn it off. See Chapter 22 for techniques to set and save exact view orientations.